NAS Target System Description (TSD)

Briefing to NASA's NExTNAS CNS Workshop

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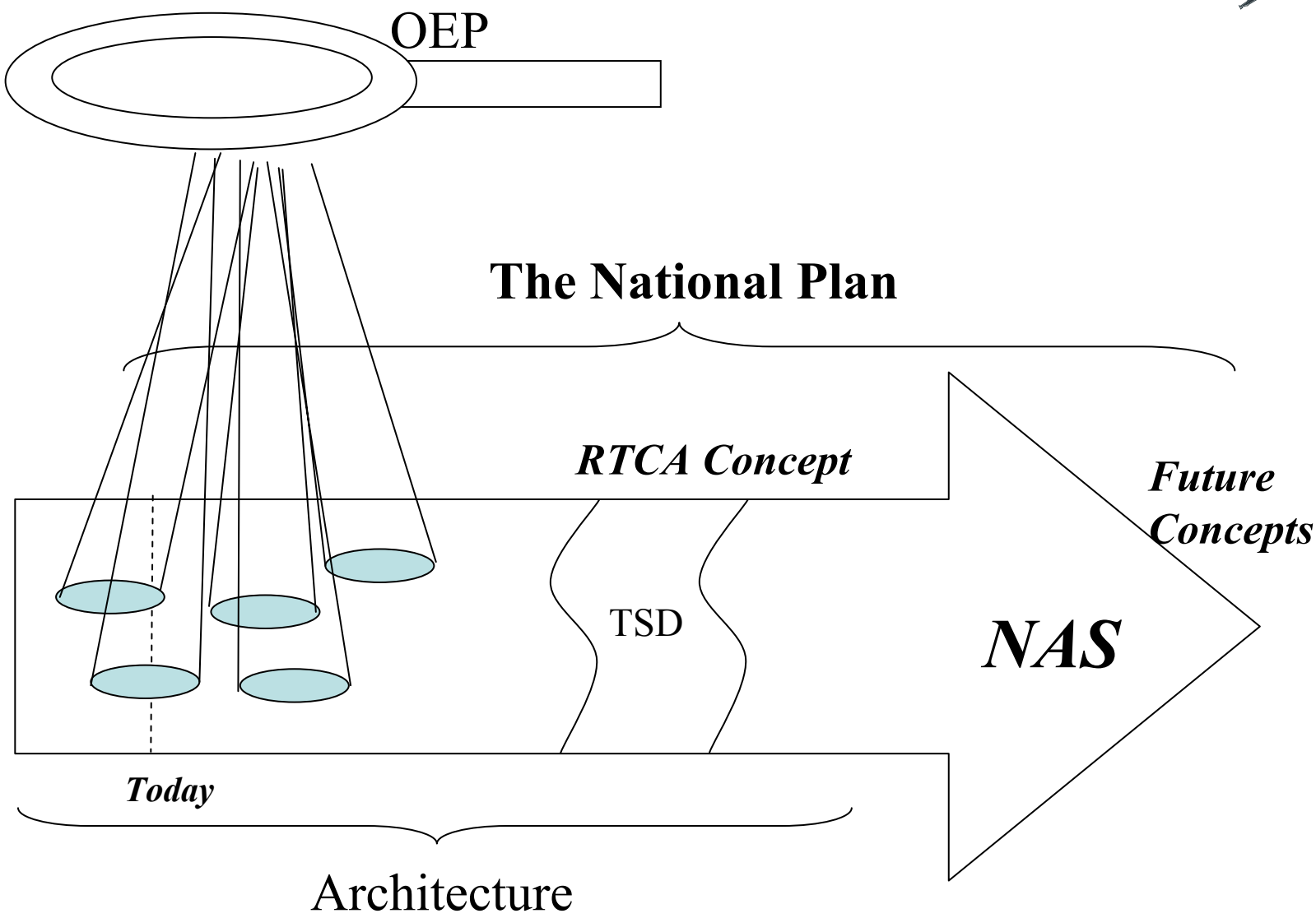
What is the Target System Description?

- The FAA is modernizing the NAS – to achieve the Joint CONOPS
- The TSD describes how far we expect to get by 2015
  - The systems implemented
  - The services provided
  - The operational capabilities achieved

Why develop Target System?

- Planners (JPO, Boeing) exploring the future (beyond 2015) need to have a realistic estimate of where the NAS will be in 2015 and what part of the Joint CONOPs will be achieved
- Ensure that our modernization efforts are prioritized and focused to achieve the desired operational goal

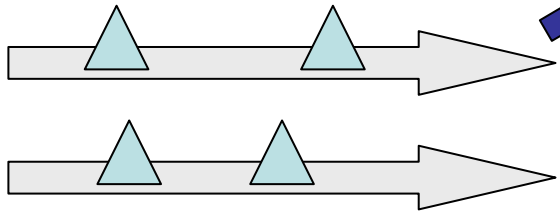
Relationship of NAS Plans



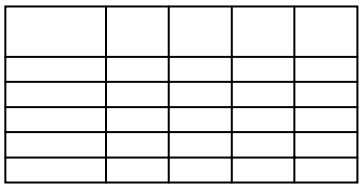
TSD Development Process

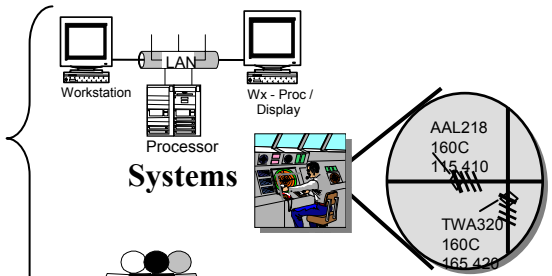
Desired Benefits

Operational Improvements



Concept SHALLS



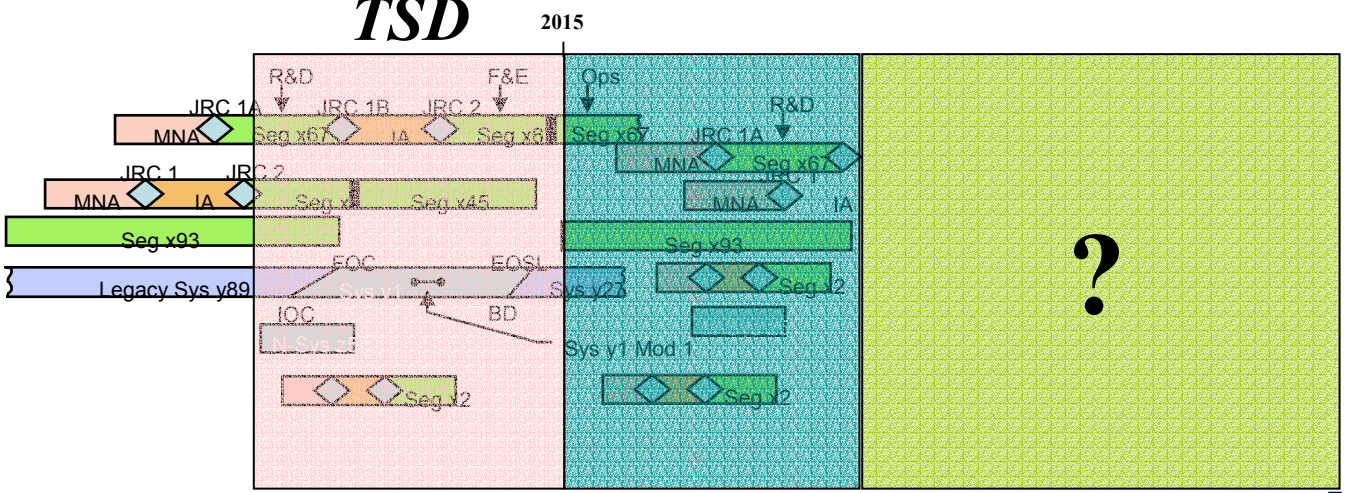


Roles & Responsibilities

Delivered Benefits

RTCA Conops

TSD



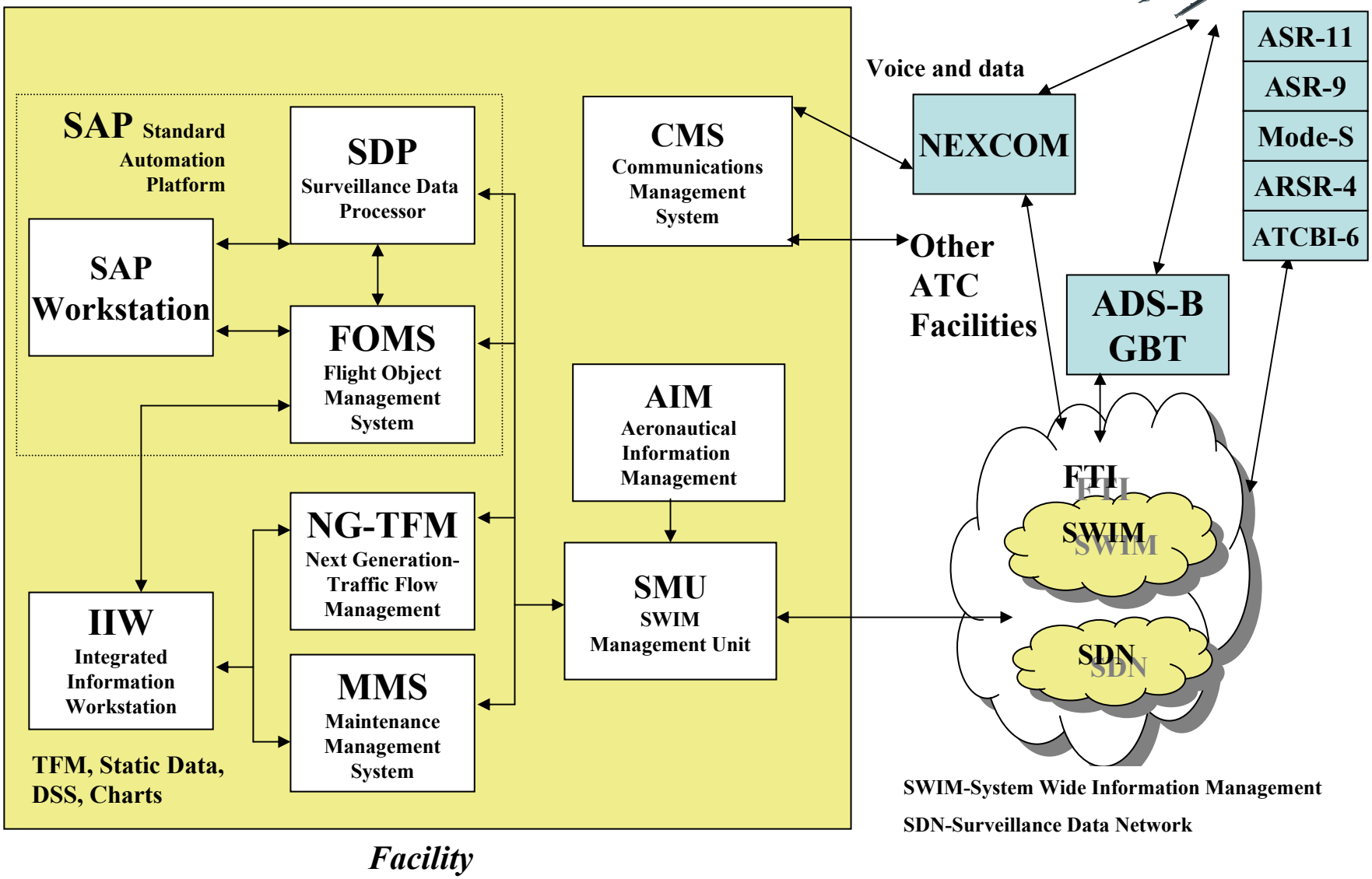
Target System Description

- Domains
- Enablers
- TSD Relationship to CNS Projects Proposed in NExTNAS
- Additional TSD Information

Domains (Facilities)

- Terminal (Arrival/Departure)
- En Route/Oceanic (En Route)
- Surface (Tower)
- TFM (Strategic Flow)
- Flight Advisory Services

Arrival/Departure



Future System Summary

Acronym	Future System	Description	Benefit
SAP WS Yellow	Standard Automation Platform Workstation (SAP WS)	The Standard Automation Platform (SAP) consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. SAP will be installed in En Route and Arrival/Departure facilities. SDP performs surveillance data processing and tracking on Surveillance Data Objects (SDO) received from the Surveillance Data Network (SDN). FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management (SWIM) network. The SAP workstation provides the controller interface for FOMS and SDP.	Common workstation in En Route and Arrival/Departure environment reduces training costs and supports facility integration.
SDP Yellow	Surveillance Data Processor (SDP)	The Surveillance Data Processor (SDP) is a component of the Standard Automation Platform (SAP). SDP processes radar and automatic dependent surveillance data received from the Surveillance Data Network (SDN) in the form of Surveillance Data Objects (SDO). SDP interfaces to the SDN via the System Wide Information Management (SWIM) Management Unit (SMU). The SDP performs tracking and alert processing for aircraft violating separation minima with other aircraft or restricted airspace. The SDP sends the track data to the Flight Object Management System (FOMS) for association with flight data. The SDP extends Minimum Surveillance Performance (MSP) for procedures and supports TIS-B.	Accepts and processes all surveillance sources. Common processor for En Route and Arrival/Departure. Reduces maintenance cost.
FOMS Yellow	Flight Object Management System (FOMS)	The Flight Object Management System (FOMS) is a component of the Standard Automation Platform (SAP). FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit (SMU). FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). FOMS supports flight planning up to 180 day prior to day of flight. A user can access the flight object from initial to close-out in the same manner.FOMS provides end-to-end flight data management from preflight to post-analysis. Ownership of the flight object begins and ends with TFM and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, …..ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.	Common processor for En Route and Arrival/Departure. Reduces maintenance cost.

Green – Fully Funded

Yellow – Evolutionary

Red – New Start

Future System Summary (cont.)

Acronym	Future System	Description	Benefit
FTI **Green**	FAA Telecommunications Infrastructure (FTI)	The FAA Telecommunications Infrastructure (FTI) services will replace most FAA-owned and leased telecommunications systems/services and consolidate their functions under a single service provider.	Provides infrastructure for SDN and SWIM.
GBT **Red**	ADS-B Ground Based Transceivers (GBT)	ADS-B Ground Based Transceivers (GBT) will be installed at 900 locations, including all secondary surveillance sites and 140 airports (4 stations each) to support ADS-B and TIS-B via UAT and 1090 data links. The ground stations will transmit all ADS-B reports received down the 1090 link back up on the UAT link and vice versa. Surveillance data from radar sources will be transmitted on both the UAT and 1090 links. GBT will support FIS-B on UAT.	Facilitates CDTI.
IIW **Yellow**	Integrated Information Workstation (IIW)	IIW will offer controllers a standard decision support workstation in each facility.	Integrate and manage data.
MMS **Yellow**	Maintenance Management System (MMS)	MMS will monitor and control NAS equipment. MMS will provide the status information to SWIM, making it available to all NAS users in near real-time.	More timely NAS status data available on SWIM.
NEXCOM **Yellow**	NEXCOM	NEXCOM radios provide VDL-3 technology which supports both voice and data air to ground communications.	Voice and data link available on a single radio

Green – Fully Funded

Yellow – Evolutionary

Red – New Start

Future System Summary (cont.)

Acronym	Future System	Description	Benefit
NG-TFM **Yellow**	Next Generation Traffic Flow Management (NG-TFM)	Enhanced decision support systems provide increased information exchange between service providers and users via SWIM. Provides post event analysis, increased predictability, and manages pre- and post-flight information.	Increases access and predictability. Optimizes NAS efficiency.
CMS **Yellow**	Communications Management System (CMS)	The Communications Management System (CMS) will manage NAS voice and data link communication links. CMS will manage ground to ground as well as air to ground communications.	Provides the flexibility to access some applications by either voice or data communications.
SDN **Red**	Surveillance Data Network (SDN)	NAS surveillance systems, including radar and automatic dependent surveillance systems, will provide data to the SDN. The SDN will process the input surveillance data and publish Surveillance Data Objects (SDO) that will be made available to NAS and other users, including TSA, DOD, etc.	Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace and dynamic re-sectorization.

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Yellow – Evolutionary

Red – New Start

Future System Summary (cont.)

Acronym	Future System	Description	Benefit
SMU Red	SWIM Management Unit	A SWIM Management Unit, at each facility, will support the sending (publishing) and receiving (subscribing) of data on SWIM and the SDN.	Provides a secure interface to SWIM.
SWIM Red	System Wide Information Management (SWIM)	SWIM provides for NAS-wide transport and sharing of information between the FAA and users. SWIM is a consistent and single point of entry to publish and subscribe to NAS data. SWIM replaces many single focus networks such as CDMnet, TMAnet, URETnet, etc. SWIM provides context-sensitive information to NAS elements that require the information. This includes flight deck access to the information, such as weather and resource status. SWIM consists of subnets that carry specific types of data, including Collaborative Decision Making (CDM) data, Aeronautical Information, Weather data, and Flight Objects.	NAS-wide data availability in near real-time.
AIM Red	Aeronautical Information Management (AIM)	The Aeronautical Information Management (AIM) system collects, manages, and distributes the information needed to support flight planning. This includes NOTAMS, NAS status data, etc. AIM provides uniform structure and definitions of flight constraints for use in flight planning and flight data management.	Improves information available for flight planning.

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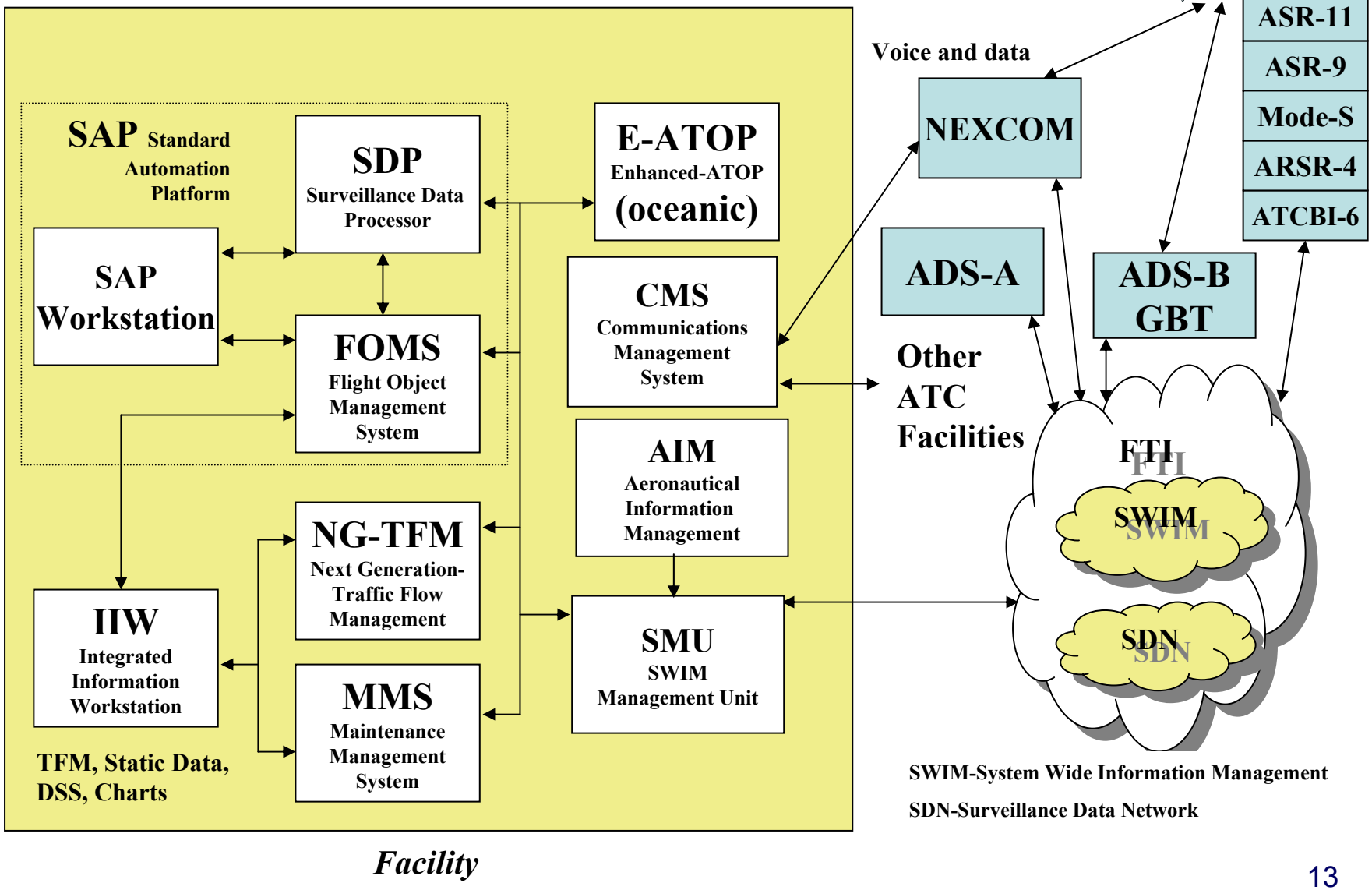
En Route



Facility

Future System Summary

Acronym	Future System	Description	Benefit
E-ATOP **Yellow**	Enhanced Advanced Technologies and Oceanic Procedures (E-ATOP)	Enhanced-Advanced Technologies and Oceanic Procedures (E-ATOP) will provide and manage the automation and information for the control of Oceanic air traffic.	Seamless ATM/CNS and predictable and flexible airspace.

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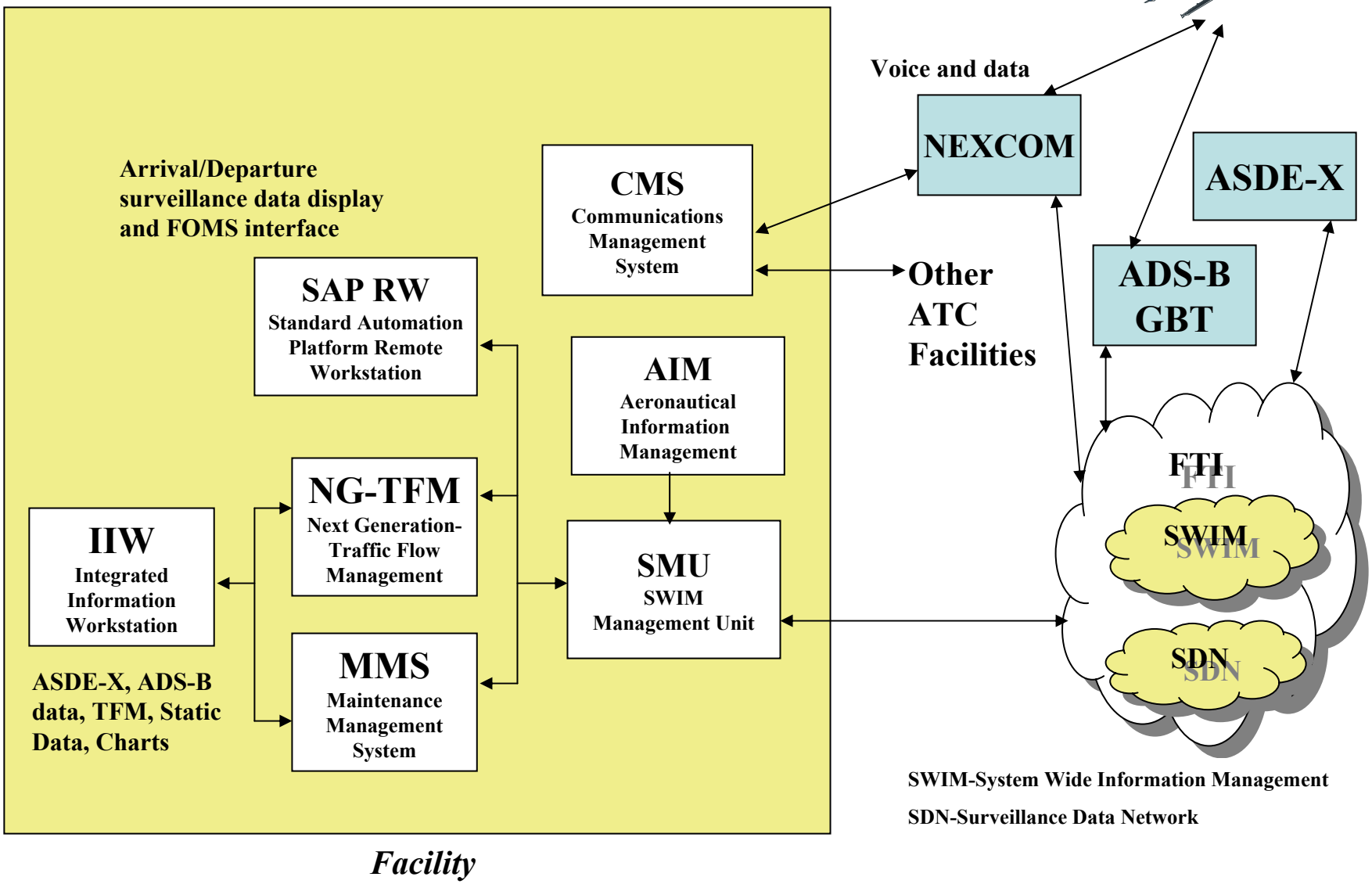
Tower


Arrival/Departure surveillance data display and FOMS interface
CMS
Communications Management System
SAP RW
Standard Automation Platform Remote Workstation
AIM
Aeronautical Information Management
NG-TFM
Next Generation-Traffic Flow Management
IIW
Integrated Information Workstation
SMU
SWIM Management Unit
MMS
Maintenance Management System
ASDE-X, ADS-B data, TFM, Static Data, Charts
Facility
Voice and data
NEXCOM
ASDE-X
ADS-B GBT
Other ATC Facilities
FTI
SWIM
SDN
SWIM-System Wide Information Management
SDN-Surveillance Data Network

Future System Summary (cont.)

Acronym	Future System	Description	Benefit
SAP RW Yellow	Standard Automation Platform Remote Workstation (SAP RW)	The Standard Automation Platform (SAP) Remote Workstation provides the controller in the tower and the specialist in Flight Advisory Services (FAS) an interface to the Flight Object Management System (FOMS). The workstation additionally provides the tower controller a display of arrival/departure surveillance data	Economies of scale and maintainability.

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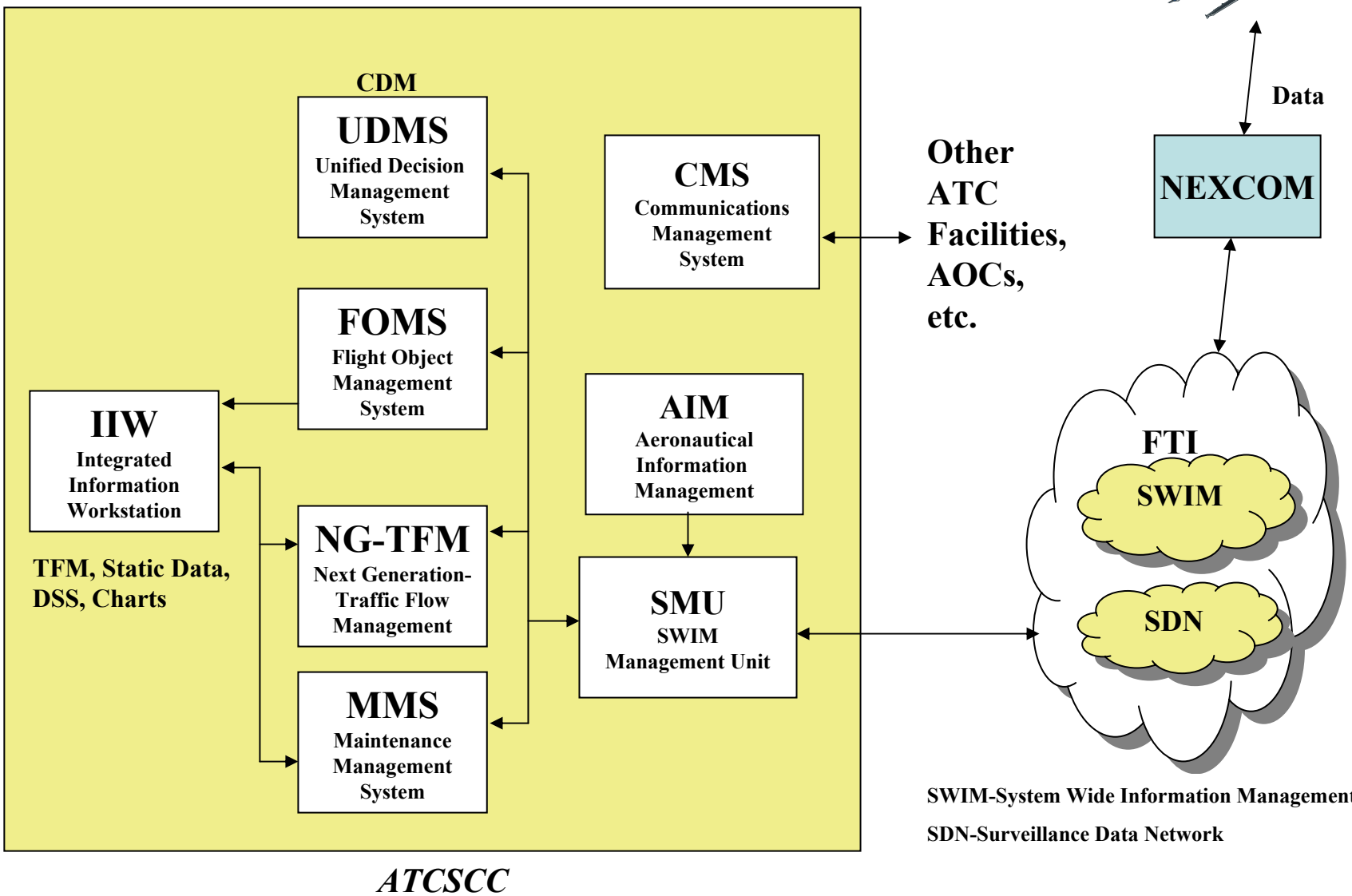
Yellow – Evolutionary

Red – New Start

Strategic Flow



Future System Summary (cont.)

Acronym	Future System	Description	Benefit
UDMS **Yellow**	Unified Decision Management System (UDMS)	The Unified Decision Management System (UDMS) will provide the framework to develop and document collaborative decisions. This will move the Collaborative Decision Making (CDM) process from voice to data communications.	Improves collaboration and documents decisions.

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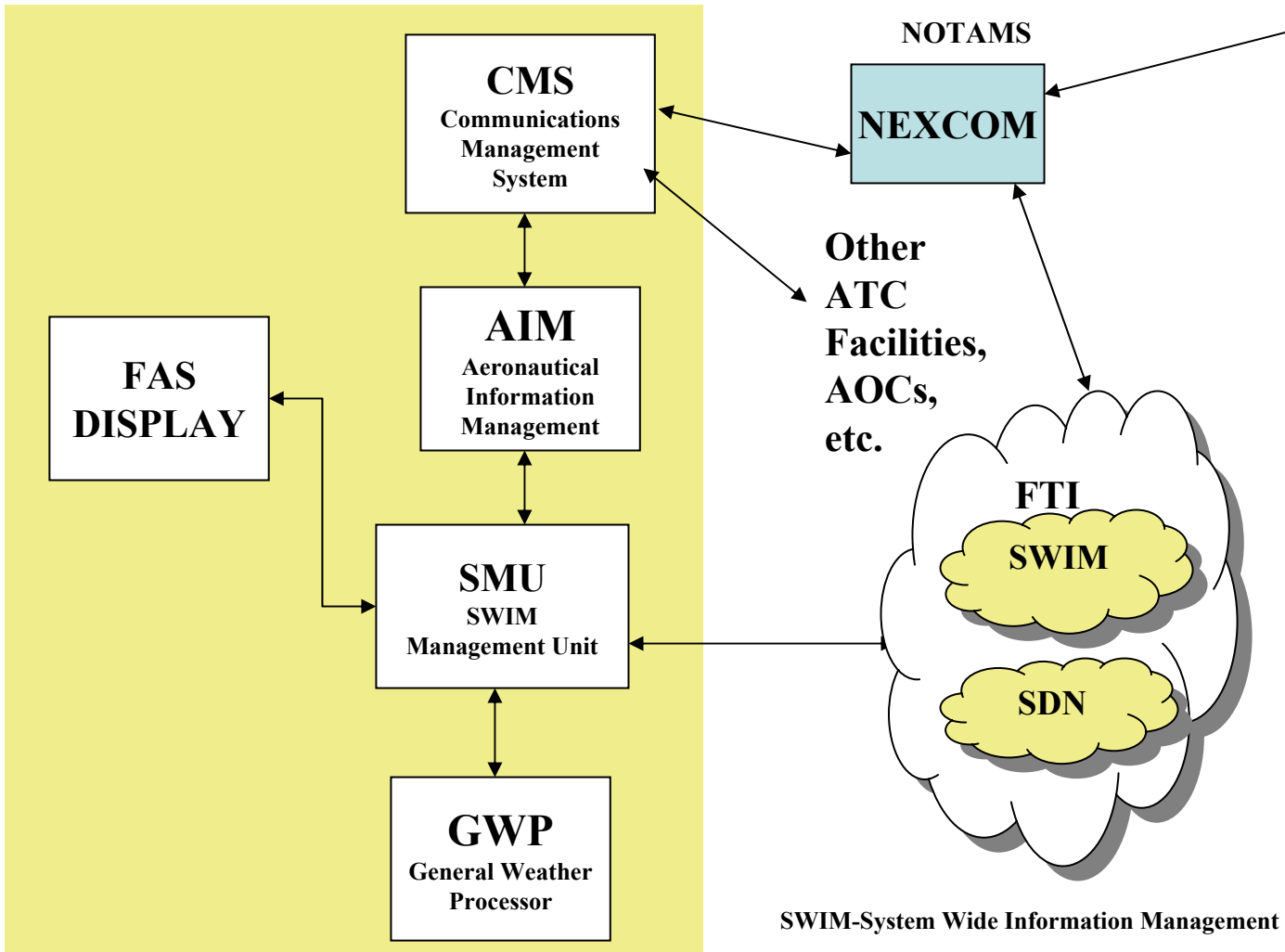
Yellow – Evolutionary

Red – New Start

Flight Advisory Service (FAS)



SWIM-System Wide Information Management

SDN-Surveillance Data Network

Function

Future System Summary (cont.)

Acronym	Future System	Description	Benefit
FAS Display **Yellow**	Flight Advisory Service Display	The FAS display could be any of the following: SAP workstation, SAP remote workstation, the IIW, or a third-party vendor.	Provides flexibility in allocating the FAS functionality.
GWP **Red**	General Weather Processor (GWP)	The General Weather Processor (GWP) collects, processes, displays, and distributes weather products. The GWP receives weather products from multiple sensors and publishes processed weather information to the System Wide Information Management (SWIM). GWP provides a standard set of algorithms and access to data for current status and forecasts of weather used in all NAS services.	Improved weather products available via a common automation system.

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Yellow – Evolutionary

Red – New Start

Enablers

- Automation
- Communications (G/G, A/G, Data Link)
- Navigation
- Surveillance (all sources)
- Weather

Automation

Tower	**ACE-IDS, DBRITE**	**IIW, SAP RW**
Arrival/Departure	**ARTS, STARS, TMA**	**IIW, SAP (FOMS, SDP, SAP Workstation)**
En Route	**HOST, DSR, URET, TMA**	**IIW, SAP (FOMS, SDP, SAP Workstation)**
Oceanic (En Route)	ODAPS, ATOP	E-AT**OP**
Strategic Flow	**CDM, ETMS, POET, FSM**	**UDMS, NG-TFM, IIW, MMS, FOMS**

Standard Automation Platform (SAP)

Flight Object Management System (FOMS)

Surveillance Data Processor (SDP)

SAP Remove Workstation (SAP RW)

Enhanced-Advanced Technologies and Oceanic Procedures (E-ATOP)

Unified Decision Management System (UDMS)

Next Generation-Traffic Flow Management (NG-TFM)

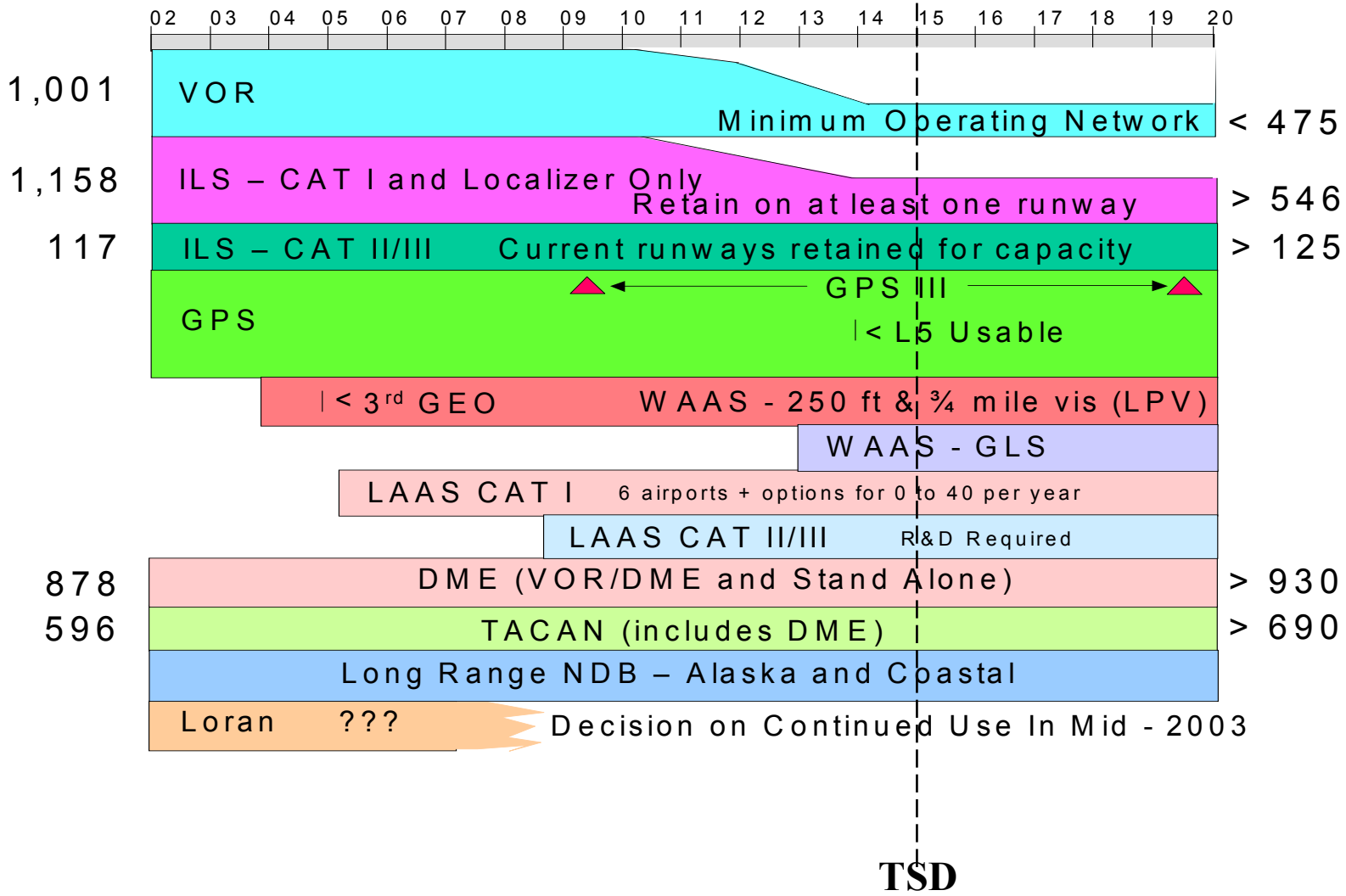
Integrated Information Workstation (IIW)

Maintenance Management System (MMS)

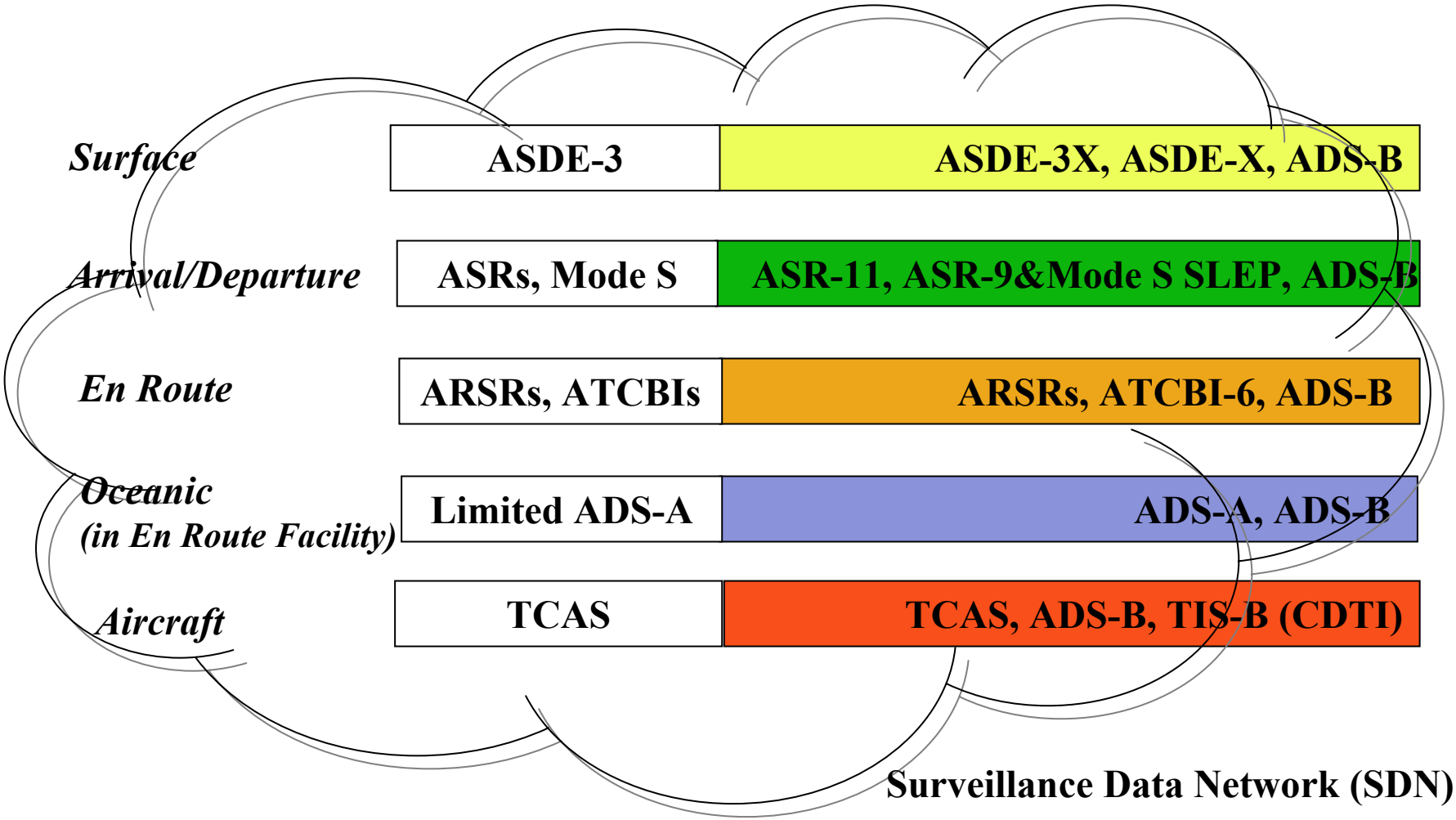
Communications

Ground Infrastructure	NICS, LINCS	FTI
Flexible Voice Switches	**VSCS, ICSS, ETVS, RDVS**	**Flexible Voice Switches**
Air/Ground Voice	VHF/UHF Radios	**VDL-3 (NEXCOM)**
Air/Ground Data	D-ATIS	**ADS-B, VDL-3 (NEXCOM)**
G/G Data Comm	Point-to-Point	**SWIM, SDN**

Navigation


02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20
1,001
VOR
Minimum Operating Network
< 475
1,158
ILS – CAT I and Localizer Only
Retain on at least one runway
> 546
117
ILS – CAT II/III
Current runways retained for capacity
> 125
GPS III
GPS
< L5 Usable
< 3rd GEO
WAAS - 250 ft & ¾ mile vis (LPV)
WAAS - GLS
LAAS CAT I
6 airports + options for 0 to 40 per year
LAAS CAT II/III
R&D Required
878
DME (VOR/DME and Stand Alone)
> 930
596
TACAN (includes DME)
> 690
Long Range NDB – Alaska and Coastal
Loran ???
Decision on Continued Use In Mid - 2003
TSD

Surveillance



Weather

Sensors

Surface	ASOS, AWOS	ASOS, AWOS improvements
Arrival/Departure	TDWR, WSP	TDWR, WSP tech refresh
		Fog/low ceiling predictor, wake vortex
En Route	NEXRAD	NEXRAD modernization
Oceanic (in En Route Facility)		Transoceanic flight tailored products
Aircraft	MDCRS	MDCRS, FIS-B (UAT)

Processors

Arrival/Departure	ITWS	GWP
En Route	WARP, CIWS	GWP
TFM	ITWS, WARP, CIWS	GWP

General Weather Processor (GWP)

TSD Relationship to Proposed CNS Projects in NExTNAS

CNS Project Technology	Related TSD System
1. Transitional CNS Architecture	SWIM, SDN
2. Global Aeronautical Networks	SWIM, SDN, NEXCOM
3. Space-based Surveillance	GBT (ADS-B/TIS-B)
4. Oceanic C & S	ADS-A
5. Multimode/Multifunction Avionics	NEXCOM
6. VHF Systems Optimization	NEXCOM
7. Terminal Area Communications	NEXCOM
8. Spectrum Research	NEXCOM
9. Surface ICNS Network	NEXCOM, GBT (ADS-B/FIS-B/TIS-B)
10. CNS Technologies	GBT (ADS-B/TIS-B)

Additional TSD Information

- TSD information available in CATS-I in Fall of 2003
  - http://www.nas-architecture.faa.gov/cats/
- NAS Architecture
  - http://www.faa.gov/nasarchitecture/
- Operational Evolution Plan (OEP)
  - http://www.faa.gov/programs/oep
- Capital Investment Plan (2004-2008)
  - http://www1.faa.gov/asd/cip04/FY04cip.htm
- FAA Homepage
  - http://www.faa.gov
- Draft FAA Strategic Plan
  - http://www1.faa.gov/apo/strategicplan/